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**APPLICATION FOR
A PATENT OF INVENTION**

1st PUBLICATION

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- (54) Tight sliding doors**
- (72) Invention of:**
- (33) (32) (31) Conventional priority:**

The present invention relates to tight sliding doors which are used to assure closing of enclosures in which a controlled atmosphere and/or a temperature exists.

Numerous tight sliding doors are already known and, in all the known devices, the tightness between the door and the framework of the opening to be closed is obtained by making this door undergo a displacement in two directions; on the one hand, vertically and downward, so as to apply the lower edge of the door against the floor and, on the other hand, horizontally toward the wall so as to apply the adjacent face of the door against the frame, a tightness equipment being provided on one or the other of these two surfaces. These arrangements present a major inconvenience which is the following: given the large dimension of these doors, in practice, the surfaces facing the door and the frame are not rigorously parallel, so that, in order to ensure correct tightness, in spite of this absence of parallelism, it is necessary to apply the door against the wall with a large force, which implies utilization of relatively heavy and costly means. In certain cases, the movement of approach of the door toward the wall is carried out by displacing it in its entirety along a horizontal direction which is oblique with respect to the plane of the wall. In such an arrangement, at the end of the course, there is a relative sliding between the tightness surfaces carried respectively by the door and the frame, which causes rapid wear of these surfaces.

The goal of the invention is to realize a device with a tight sliding door, by remedying efficaciously the disadvantages of the known devices, nevertheless permitting to obtain sufficient tightness for the envisaged application, that is, the closing of the enclosure with controlled atmosphere and/or temperature, such as storage chambers.

This result is obtained with the aid of a device in which the door is equipped with guiding means that permit it to be displaced on a fixed rail with respect to the frame, the door and the frame having on their two vertical sides and on their upper side tightness fittings which delimit active complementary oblique surfaces with respect to the plane of the wall and the door, means which are provided on the rail so that when coming to near the position of closure, the door is displaced vertically and laterally in its vertical plane, the tightness being realized by the three sets

of tightness fitting coming into contact, as well as by another fitting provided on the lower edge of the door coming into contact with the floor.

According to an embodiment, two complementary tightness fittings, carried respectively by the frame and by the door, present opposite faces which are almost parallel, directly obliquely with respect to the plane of the wall and the door.

The means, which permit one to carry out vertical and lateral displacement of the door in its plane to assure closure and tightness, can be constituted by ramps or nocks made in the guidance face of the rail, these ramps or nocks also assuring maintenance of the door in its position of closure.

This invention will be described in more detail by referring to the drawings given only as examples and on which:

Figure 1 is a perspective view with tothing a tight sliding door according to the invention;

Figure 2 is a sectional view according to line 2-2 of Figure 1;

Figure 3 is a sectional view according to line 3-3 of the same Figure 1;

Figure 4 is a partial frontal elevation view of a variant; and

Figure 5 is a view in partial frontal elevation of another variant of the embodiment.

In Figure 1, one can see a tight sliding door P destined to assure tight closing of an opening made in a wall M. On this wall hinges or brackets 1 are attached, which can be controlled vertically, and which support a guide rail 2. This rail itself is mounted on the brackets so as to be able to be controlled horizontally. The means permitting these controls are well known in the art and therefore do not have to be described in detail.

On its upper part, the door P carries braces 3 on which rollers 4 are mounted, which become displaced along the rail. As can be seen in Figure 2, the braces 3 are also attached to the door in a controllable manner and it is noted that the vertical branch 3^a of these braces is inclined so as to bring the axis 5 of the guide rollers toward the exterior of the door. In convenient locations, the rail has two nocks or indentations 6, the purpose of which is to receive the rollers when the door comes near its closing position.

It is noted that the free interval between the upper edge of the door and the brackets 1 should be less than the depth of the throats of the rollers so as to avoid untimely disengagement of the door.

Tightness fittings 7, 8, 9 are attached to the two vertical sides and on the upper edge of the frame, which, in the example represented, all have the same cross-section and have a wing of attachment 10, 11, 12 on the wall and an oblique face 13, 14, 15 inclined at approximately 45° with respect to the plane of the wall, the purpose of this oblique face being to come into contact with the complementary fittings 16, 17, 18 carried by the door. It is noted that fittings 7, 8, 9 are fixed on the frame so as to be able to be controlled perpendicularly at their longitudinal direction. It is thus, that elements 7 and 8 can be controlled horizontally and element 9 can be controlled vertically, with the aid of, for example, the presence of slots of oblong shape.

It can also be seen that a chock 10^a is interposed between fitting 7 and the frame in order to take into account the thickness of fittings 8, 9 carried by the same frame.

Regarding the door, it is equipped on its left vertical edge considering the drawing, with a fitting 16 attached so as to be able to be controlled horizontally and intended to cooperate with fitting 7. It also carries on the opposite vertical edge and on the upper vertical edge of its face turned toward the wall, two other fittings 17, 18, intended to cooperate respectively with fittings 8 and 9. It is noted that these fittings 16, 17, 18 have the same transverse section as those carried by the frame and that on their oblique faces, which are intended to be applied against the corresponding oblique faces of the fixed fittings, preferably a band 20 is provided made of a flexible material, such as a foamed plastic material with closed cells or alveoles. The actual

fittings 7, 8, 9 and 16, 17, 18 can be constituted by an extruded profiled object and a suitable rigid plastic material.

On its lower edge, the door is equipped with a suitable fitting 21.

On the floor, along the external edge of the door, guidance means may be provided, represented schematically by corner irons 22 equipped with ramps 22^a facilitating engagement of the door and its application against the lower part of the frame. Moreover, in order to limit the course of opening of the door, it is provided with a suitable stop device 23 equipped, if need be, with energy absorption or retention means.

The door being put in place by the end of the rail, which is at the right on Figure 1, the abutment device 23 is attached only after this placement.

The operation of such a door follows directly from the description which was just made: starting from its open position, against this abutment device 23, the door is displaced manually or by any other means towards its position of closing. It is displaced along the guide rail until the rollers 4 fall into the nocks or indentations 6. The door is then brought to be displaced downward by pursuing its lateral displacement toward the left, all the while remaining in its plane, which causes contact of the various sets of tightness fittings 7, 16; 8, 17; 9, 18, provided on the two vertical sides and on the upper side of the door. The fitting 21 is then applied to the floor. Given, moreover, that the door is guided to its lower part, the displacement which it undergoes is sufficient to assure correct tightness along these four sides.

It should be noted that, to obtain satisfactory tightness near an upper left corner, the vertical fitting 7 is prolonged beyond the horizontal fitting 9. Other means can also be provided to improve tightness in this zone.

In the variant shown in Figure 4, the piece 3, which is attached to the upper edge of the door and which carries the roller, is constructed so as to permit additional control. This piece is made of two parts 24, 25, a part 24 which is mounted on the door and a second part, 25, on which the roller is mounted. This second part is jointed on the former around an axis 26 and has a

course determined by the length of an incurved slot 27 centered on the axis 26 and in which a bolt 28 can be locked with a screw 29. This arrangement permits in particular control of the height of the roller.

Figure 5 represents an advantageous variant of the construction of the guide rail. The rail is made of two identical sections 30, each carried by two brackets 31. Each rail is cut beveled at its left end, considering the drawing, so as to delimit two ramps 32 playing the same role as the indentations 6 of the first embodiment and cooperating with rollers 33.

This variant is particularly advantageous for the following reasons: First of all, the rail is easier to manufacture and to transport because of its reduced size. Moreover, the two sections of the rail can be controlled independently of one another, which permits assurance that the two guide rollers can be displaced freely until the door comes into the correct closure position. In the first mode of realization this result can be obtained for sure, but at the price of a relatively precise regulation of the position of the rollers on the door.

The advantages that the invention provides are essentially the following: the door made in this way is very simple, in particular with regard to its suspension device. It is not necessary to use hydraulic jacks, eccentric devices or others which are relatively heavy and costly in order to realize the relative displacement between the door and the frame, which assures tightness. Moreover, due to its possibilities of multiple control, the device according to the invention permits easy adaptation to doors of different dimensions and, as the case may be, permits compensation of play or differences of marks resulting from inevitable deformation, or of defects of parallelism between the door and the frame.

With the aid of the orientation of the active surfaces of the tightness rolls, their coming into contact occurs without friction, which assures a long life to them and remarkable reliability.

It should also be pointed out that the profile pieces which constitute the fittings can have the same cross-section which considerably lowers the cost of assembly.

Naturally, numerous variants can be provided to this device without departing from the framework of the protection defined by this patent: in particular, the means of engagement and guidance of the door can be modified, and so can the shape or the arrangement of the tightness fittings applied to the door and the frame. On this subject, it should be pointed out that the active surfaces of these fittings are not necessarily plane, the importance being that the contact surface between the two fittings should be oriented obliquely with respect to the plane of the wall, so as to avoid any friction which would cause wear.

More complex fittings, analogous to those described in French Patent No. 1,514,257 can also be used, either along or in combination with strips of support attached on the door and/or the frame.

PATENT CLAIMS

1. Device of a tight sliding door, comprising a door which can slide along a wall between an open position and a closed position and means for assuring the tightness between the door and the frame in the closed position, characterized by the fact that the door (P) is equipped with guide means (4; 33), which are displaced on a fixed guide rail (2; 30), the door (P) and the frame (M) having at least on their two vertical sides and on their upper side, respective tightness fittings (7, 8, 9; 16, 17, 18) protruding, destined to cooperate in pairs and delineating active complementary surfaces directed obliquely with respect to the planes of the wall and the door, the guide means being such that, when the door (P) comes near or into its closing position, it is displaced vertically and laterally, remaining in its plane, which causes mutual contact of each set of fittings.

2. Device according to Claim 1, characterized by the fact that the rail (2; 30) has on its guide surface ramps or nocks (6; 32) on which the rollers (4; 33) become displaced when the door comes near or in its position of closure.

3. Device according to any of Claims 1 and 2, characterized by the fact that the rail (2; 30) is attached on the wall so as to be able to controlled horizontally and/or vertically.

4. Device according to any of Claims 1 to 3, characterized by the fact that the rail is made in two sections (30), attached separately on the wall, and each having a ramp ornock, intended to cooperate with a guide system (33) carried by the door, these ramps (32) being preferably obtained by cutting one end of each rail section at bevel.

5. Device according to any of Claims 1 to 4, characterized by the fact that the guide system (4; 33) is attached in a controllable manner on the door.

6. Device according to Claim 5, characterized by the fact that each guide system (4) is mounted on a support, this support being made in two parts, a first part (24) attached to the door, and a second part (25) carrying the guide system, jointed on the first and being able to be blocked in a specific position.

7. Device according to Claim 1, characterized by the fact that the tightness fittings are attached in a controllable manner on the floor and/or on the door.

8. Device according to any of Claims 1 to 7, characterized by the fact that the tightness fittings are constituted by profiled parts made of rigid plastic, delineating a wing of fixation and an oblique contact surface, at least some of them also carrying a roll (20) made of flexible material on this contact surface..

9. Device according to any of Claims 1, 7, 8, characterized by the fact that the fitting (7) attached to the vertical edge of the frame, located facing the front edge of the door, is prolonged in its upper part beyond the fitting (9) attached to the upper horizontal frontal edge of the frame.

10. Device according to any of Claims 1 to 9, characterized by the fact that the door is equipped on its lower edge with a fitting (21) that assures tightness with the floor.

11. Device according to any of Claims 1 and 7 to 10, characterized by the fact that a fitting (16) is attached to the edge in front of the door, considering the direction of displacement towards closing, the two other fittings (17, 18) being attached on the face of the door, which is directed toward the frame.

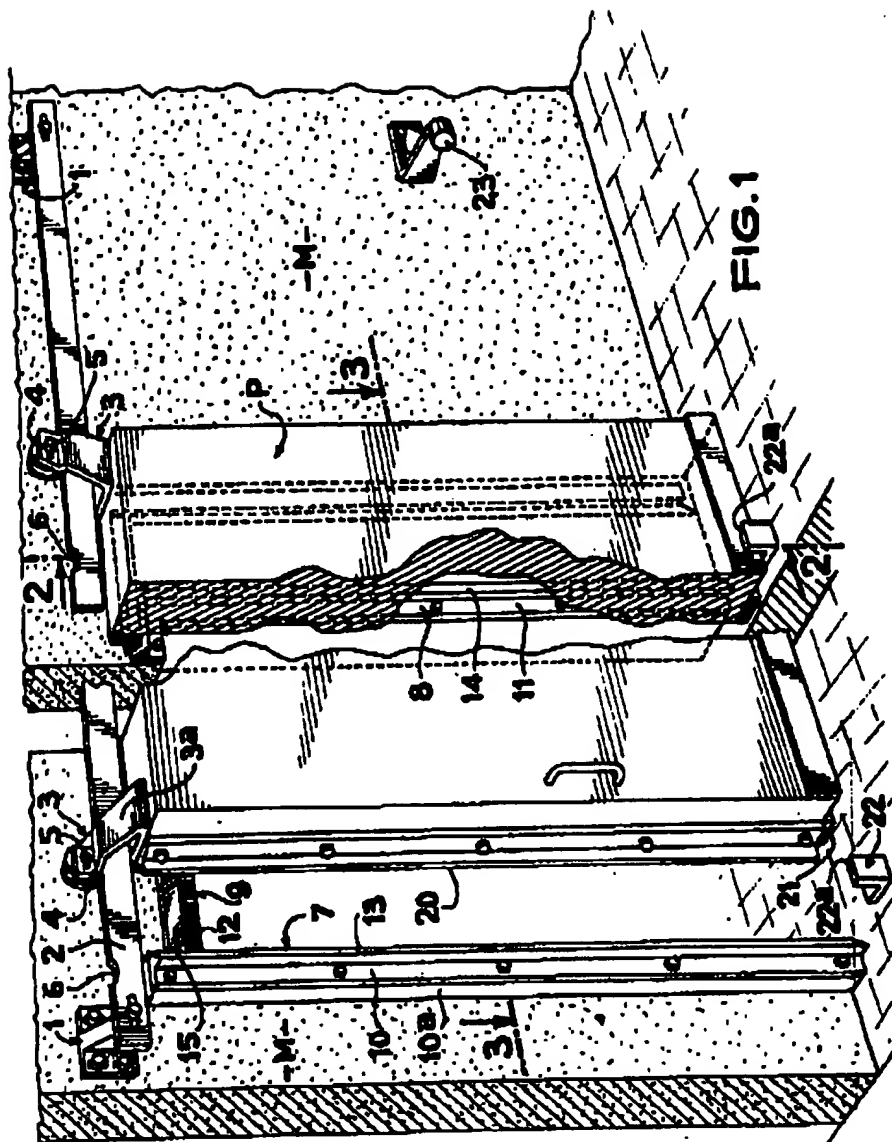


FIG. 2

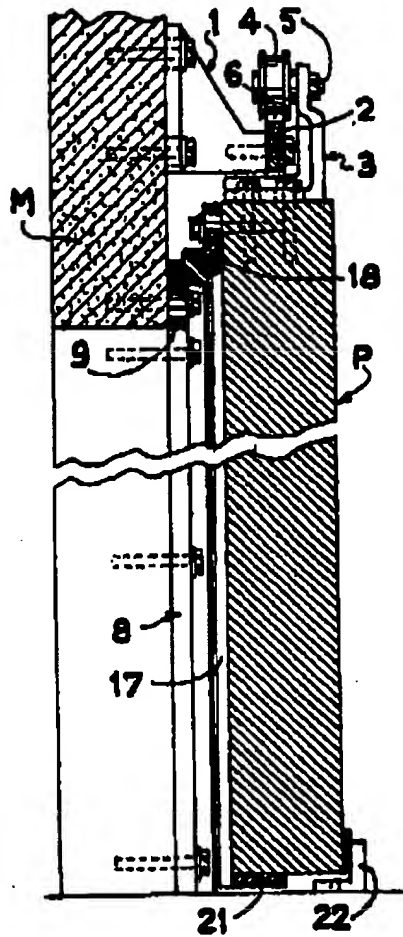


FIG. 4

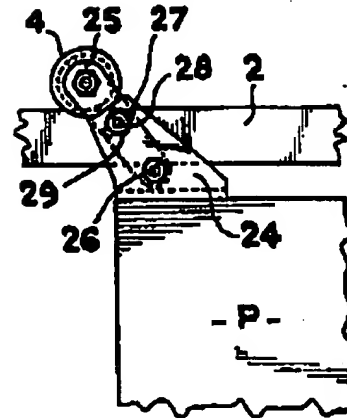


FIG. 5

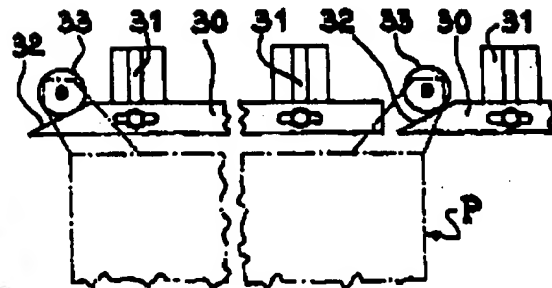


FIG. 3

